Ordering number: EN4022C

Monolithic Linear IC

LA4525

Dual AF Power Amplifier for Radio Cassette Recorders

Overview

The LA4525 requires only a small number of external components to drive either two 4 Ω speakers or one 8 Ω speaker. The output power is typically 0.65 W when driving two 4 Ω speakers.

Features

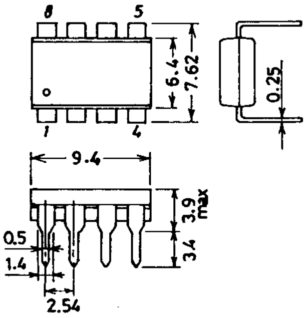
- Two-channel (dual) or single-channel (BTL) operation
- Requires only a few external components.
- 0.65 W (typ) output power into two 4 Ω speakers
- Wide power supply range: 3 to 15 V
- 8-pin DIP (No heat sink needed)

Package Dimensions

unit : mm

3001B-DIP8

[LA4525]



SANYO : DIP8

Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max	Rg = 0	15	V
Allowable power dissipation	Pd max	Note	1.5	W
Operating temperature	Topr		–25 to +75	°C
Storage temperature	Tstg		–40 to +150	°C

Note: Mounted on a 50 × 50 × 1.6 mm^3 heat dissipating board

Recommended Operating Conditions at Ta = 25°C

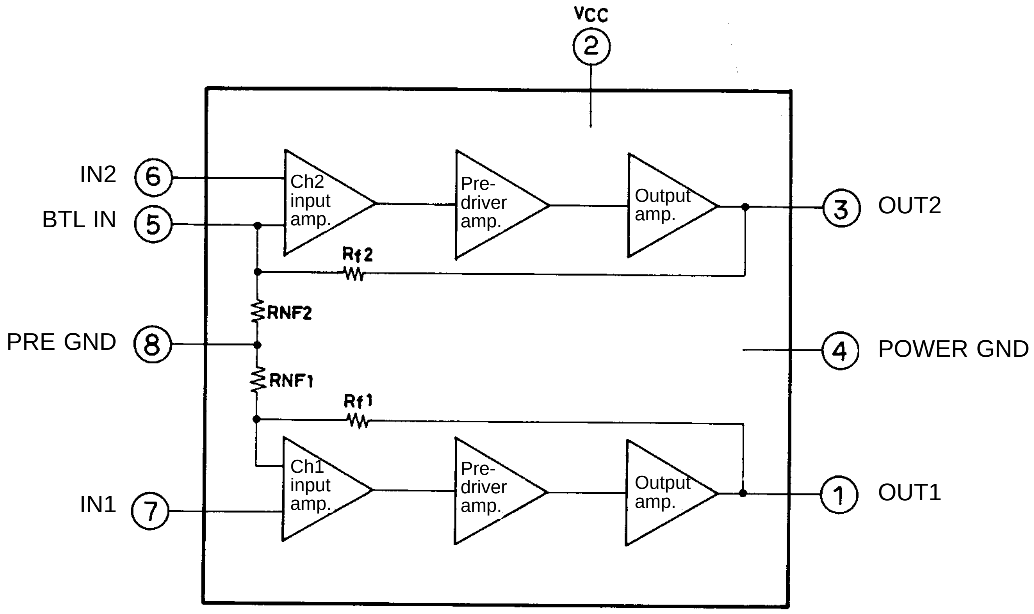
Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		6	V
Load resistance range	R_L		4	Ω
Supply voltage range	V_{CC} op	Not in excess of package Pd	3 to 15	V

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Operating Characteristics at V_{CC} = 6 V, Ta =25°C, R_L = 4 Ω, f = 1 kHz, Rg = 600 Ω, Dual operation unless otherwise noted

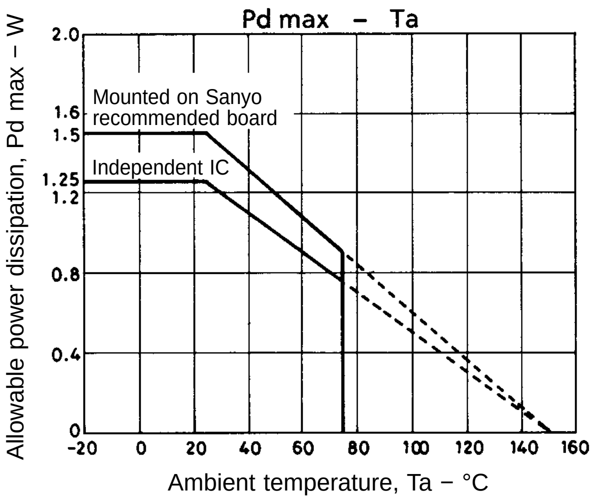
Parameter	Symbol	Condition	min	typ	max	Unit
Quiescent supply current	I_{CCO}	Rg = 0 Ω	10	15	30	mA
Output power	P_O1	THD = 10%	0.45	0.65		W
	P_O2	V_{CC} = 9 V, R_L = 8 Ω, THD = 10%		1.0		W
Voltage gain	VG	V_O = 0 dBm	38	40	42	dB
Total harmonic distortion	THD	P_O = 0.1 W		0.2	0.7	%
Output noise voltage	V_{NO}	Rg = 0 Ω, DIN AUDIO filter		100	400	μV
Supply voltage ripple rejection	SVRR	Rg = 0 Ω, f_R = 100 Hz, V_R = 0 dBm	35	43		dB
Channel separation	CH Sep	V_O = 0 dBm, R_g = 0 Ω	45	55		dB
Input resistance	Ri		70	100	130	kΩ

Equivalent Block Diagram

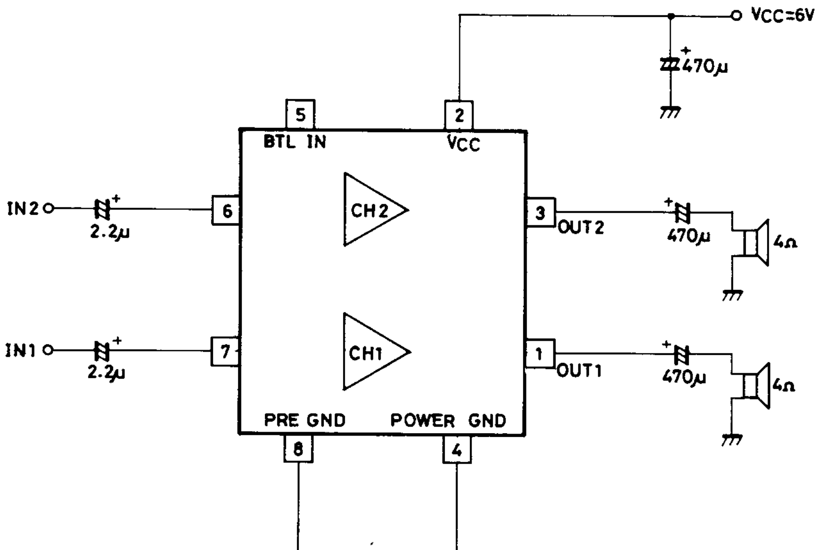


Pin Description

Number	Name	Description
1	OUT1	Channel 1 output
2	V_{CC}	Supply voltage
3	OUT2	Channel 2 output
4	POWER GND	Power amplifier ground
5	BTL IN	Bridge test load input
6	IN2	Channel 2 input
7	IN1	Channel 1 input
8	PRE GND	Preamplifier ground

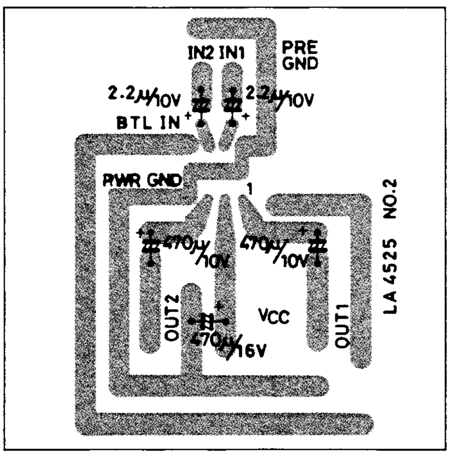


Dual Operation



Unit (capacitance:F)

Sample Printed Circuit Pattern



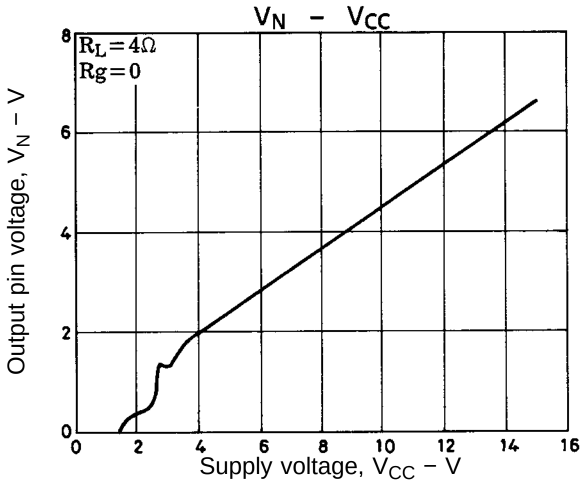
Unit (capacitance:F)
65 × 65mm^2 (Cu-foiled area)

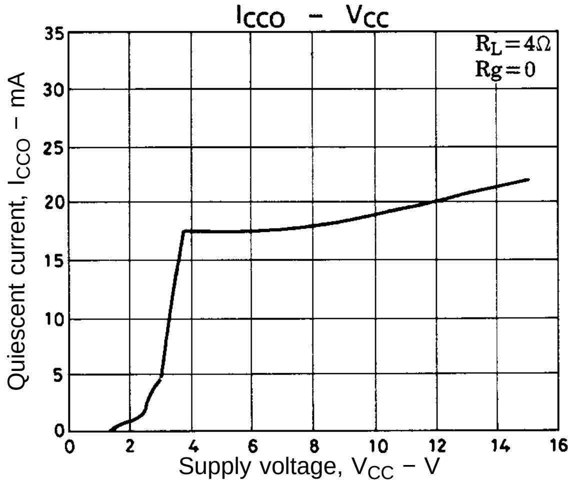
External Components Comparison

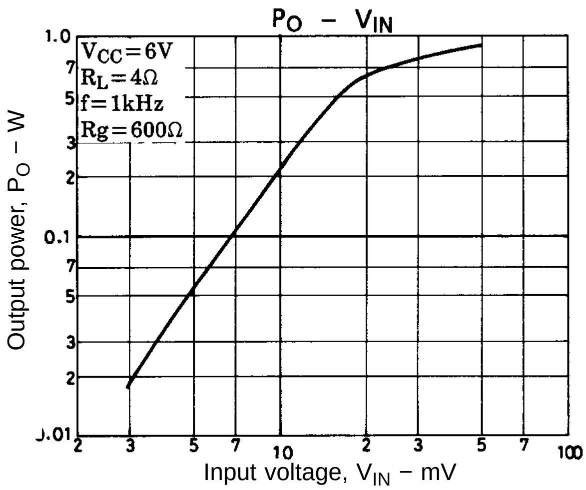
External components	Existing Sanyo ICs	LA4525
Output capacitors	○	○
Input capacitors	○	○
Bootstrap capacitors	○	×
Feedback capacitors	○	×
Filter capacitors	○	×
Oscillation damping mylars	○	×
Dual-mode operation total	11	4

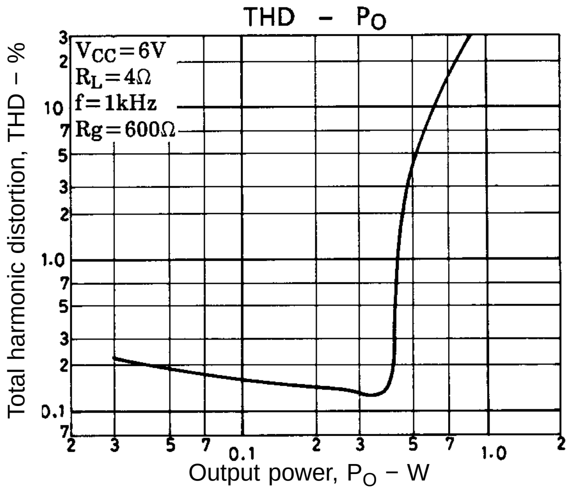
Pin Voltages

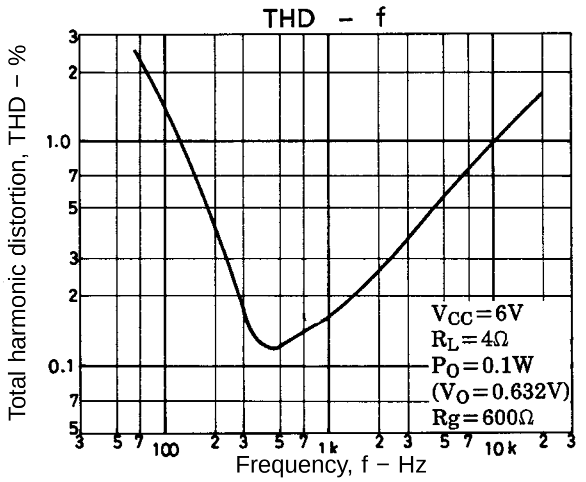
Pin number	Pin name	Pin voltage
1	OUT1	2.8 V
2	V_{CC}	6 V
3	OUT2	2.8 V
4	POWER GND	0 V
5	BTL IN	65 mV
6	IN2	1.4 V
7	IN1	1.4 V
8	PRE GND	0 V

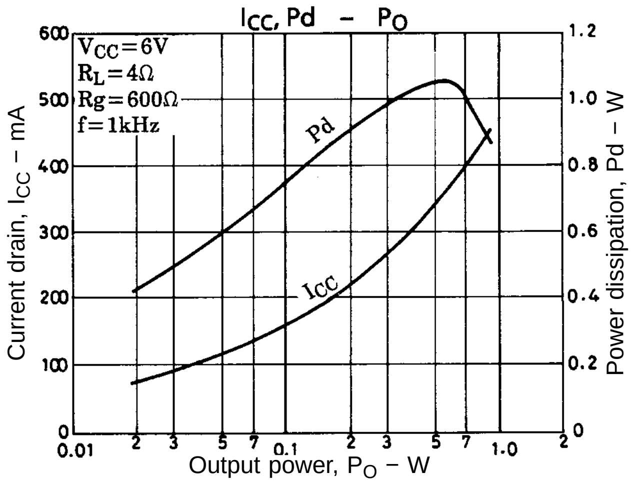


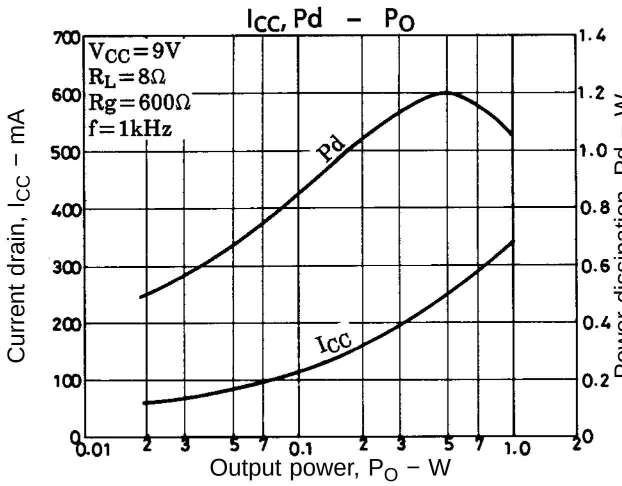


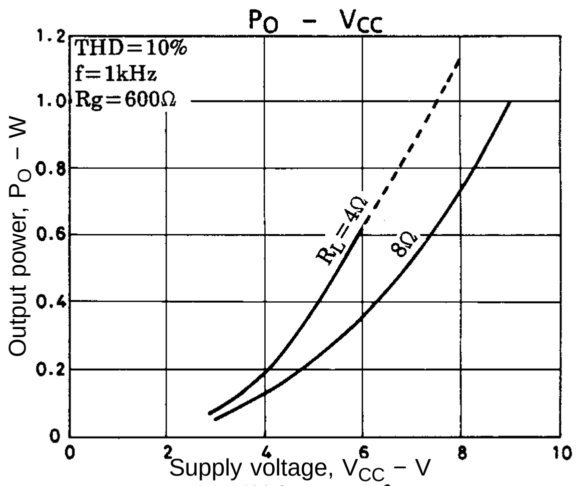


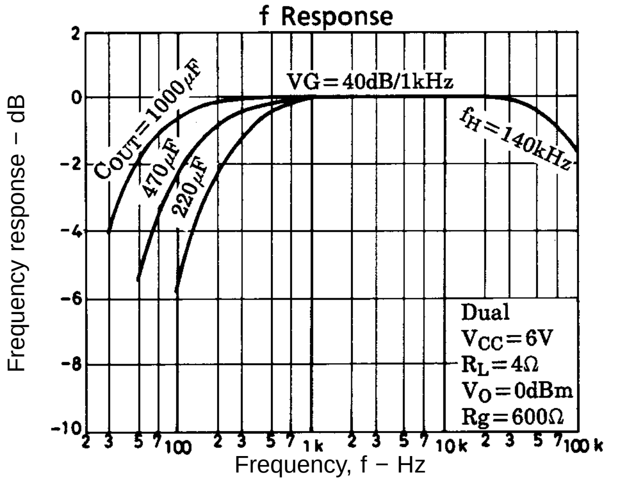


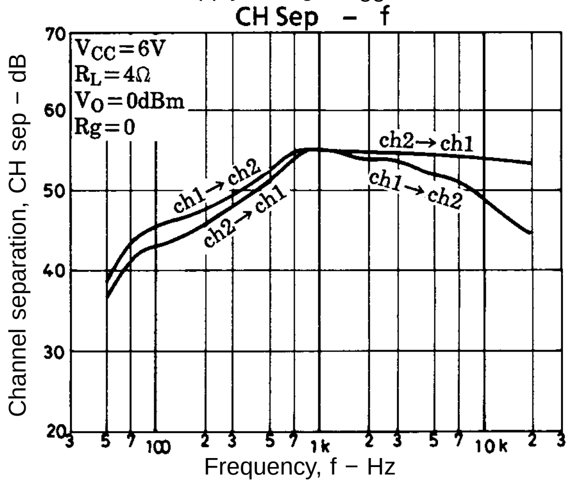


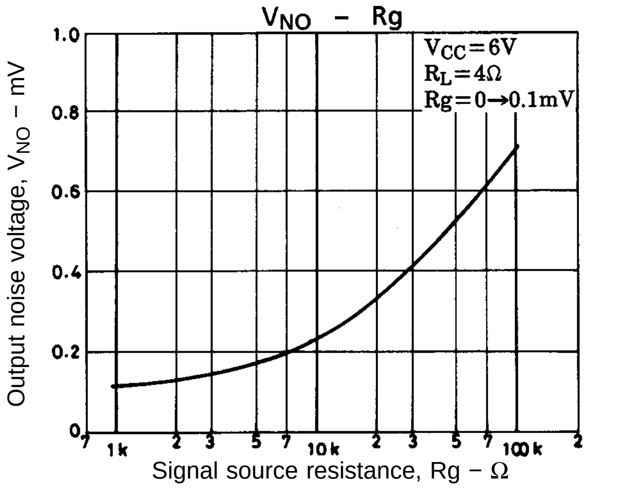


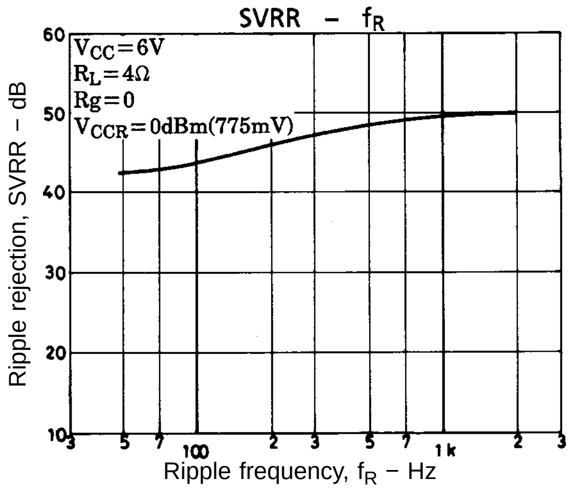

ICC, Pd – PO
VCC=9V
RL=8Ω
Rg=600Ω
f=1kHz
Pd
ICC
Current drain, ICC – mA
Power dissipation, Pd – W
Output power, PO – W


PO – VCC
THD=10%
f=1kHz
Rg=600Ω
RL=4Ω
8Ω
Output power, PO – W
Supply voltage, VCC – V

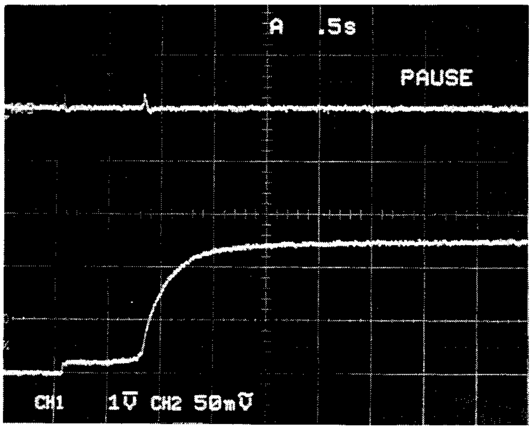

f Response
VG=40dB/1kHz
COUT=1000μF
470μF
220μF
fH=140kHz
Dual
VCC=6V
RL=4Ω
VO=0dBm
Rg=600Ω
Frequency response – dB
Frequency, f – Hz


CH Sep – f
VCC=6V
RL=4Ω
VO=0dBm
Rg=0
ch2→ch1
ch1→ch2
ch1→ch2
ch2→ch1
Channel separation, CH sep – dB
Frequency, f – Hz


VNO – Rg
VCC=6V
RL=4Ω
Rg=0→0.1mV
Output noise voltage, VNO – mV
Signal source resistance, Rg – Ω


SVRR – fR
VCC=6V
RL=4Ω
Rg=0
VCCR=0dBm(775mV)
Ripple rejection, SVRR – dB
Ripple frequency, fR – Hz

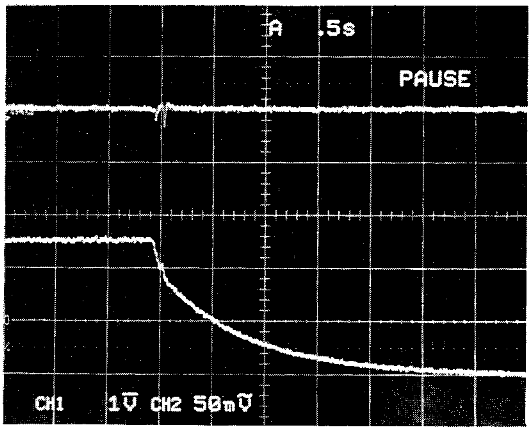
Rising and falling waveforms



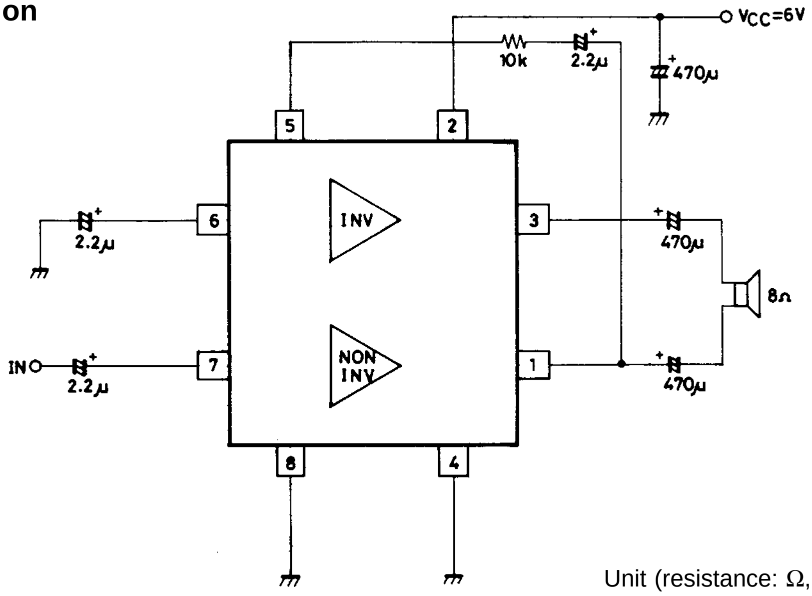
Speaker terminals

Output DC locus

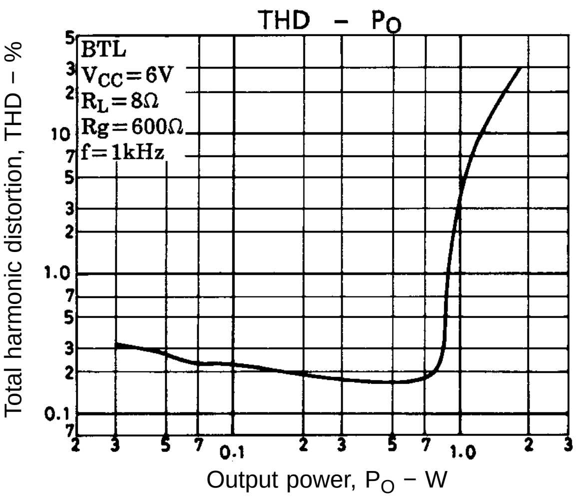
V_{CC}=6V
R_L=4Ω
Rg=0

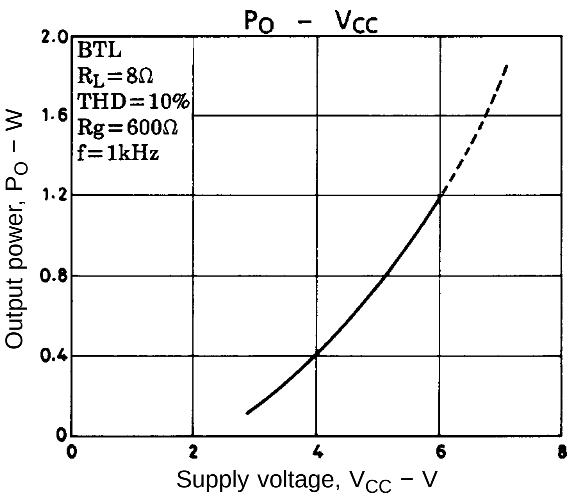


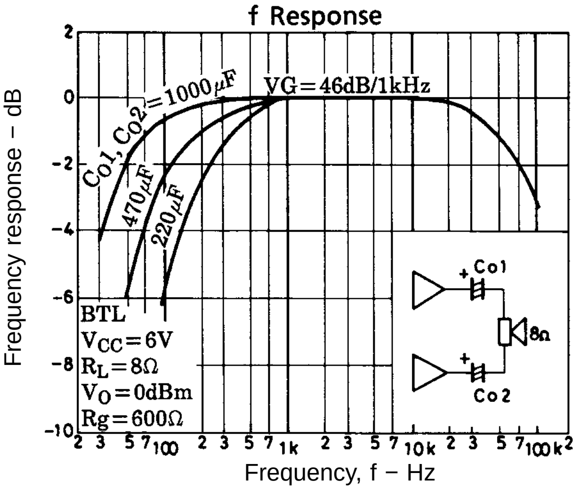
BTL Operation

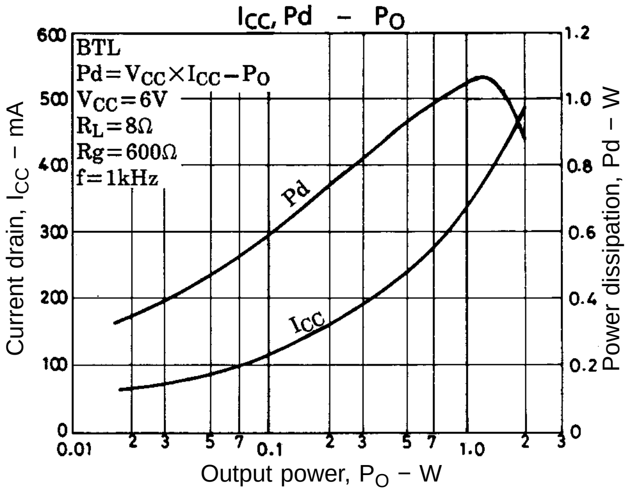


Unit (resistance: Ω, capacitance:F)









Handling Instructions and Precautions

Internal Circuits

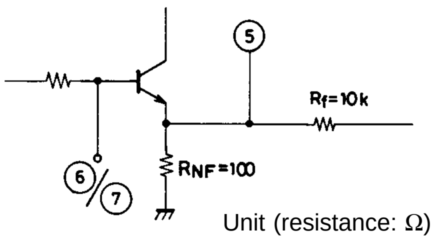


Figure 1. Input pins (6 and 7) and BTL input pin (5)

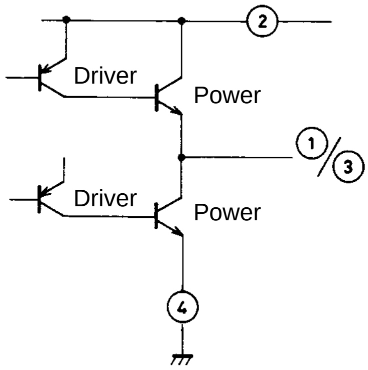
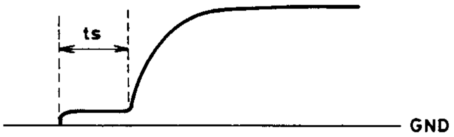


Figure 2. Output pins (1 and 3)

External Components

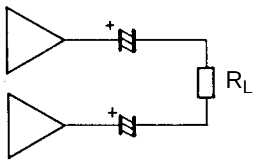
- The starting time, t_s, can be varied by changing the value of the input capacitor. A value of 2.2 μF is recommended. A smaller value will result in a lower starting time, and a larger value, a higher starting time.



- The output capacitor should have a value of 470 μF. A lower value will cause the low-frequency roll-off and low-power characteristics to deteriorate.
- A value of 470 μF is recommended for the power supply capacitor, although this can change according to the design setup conditions.
- In dual mode, BTL IN (the channel 2 negative feedback connection) should be left floating.

BTL mode

- The output capacitors should have a value of 470 μF. If these are omitted, a ‘‘popping’’ noise occurs. Also, any output offset will cause a current to flow which could damage the load under quiescent DC conditions.



- The output capacitors can be replaced with a single 220 μF bipolar capacitor. A larger value can cause switching noise when power is applied to the device.
- The voltage gain is fixed internally to 40 dB in dual mode and 46 dB in BTL mode. These values cannot be altered by connecting external components.
- Phase correction capacitance (600 pF/TOTAL) is incorporated in the internal stages. Oscillation damping components (R and C) are also incorporated in the output pin circuits.
- Power consumption
  Note that the 8-pin DIP does not have a heat dissipating surface and that the power dissipation ratings are critical. The maximum power dissipation of the device is 1.25 W, and 1.5 W when the device is mounted on the recommended PCB. The actual power dissipated depends on the supply voltage and the load conditions. Ensure that the device is kept within its maximum rating. For AC supplies, transformer tappings may need to be adjusted to keep the device within maximum ratings.

$$Pd\ max = \frac{V_{CC}{}^2}{\pi^2 R_L} + I_{CCO} \times V_{CC}$$

Note
For BTL mode operation, the value of R_L used in the calculation should be 1/2 the actual value.

- If the speaker plug jacks short to ground when connected, a protection resistor should be inserted in the output line.
- If the device is operated at or near its rated values, these values can be exceeded by small changes in operating conditions, leading to device breakdown. Accordingly, ensure that a safety margin is maintained so as not to exceed the maximum ratings.
- Check the PCB surface after soldering to ensure that no pins have been accidentally shorted. Any short between pins could cause poor operating characteristics or permanently damage the device when power is applied.
- If making the PCB, check the printed wiring to ensure that no feedback loops occur between input and output.